The Importance of Small Experiments for the Vitality of Neutrino Physics

Cristian Roca Catala - P5 Town Hall @ Fermilab & Argonne
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What constitutes a "small experiment"?

- Projects below the $10M funding scale
- Not connected to a dedicated facility - large scale project
- More focused on innovation, research and development

Benefits

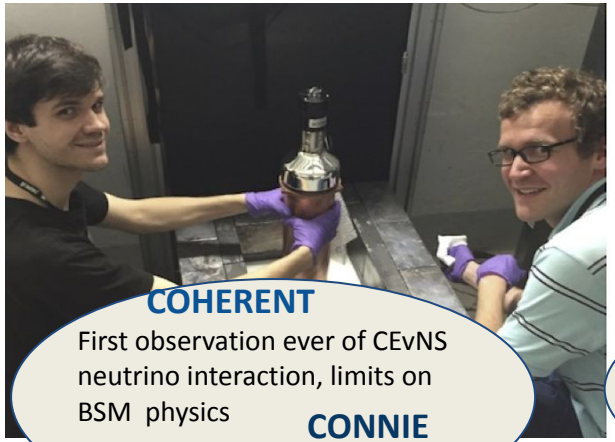
- **Training**: opportunity for **student**/early career folks to get **involved** during planning and execution of ideas
- **Leveraging**: existing equipment and **infrastructure** at Uni and Labs can be **repurposed**/reutilized
- **Exploration**: cover a wide net of **diverse** research ideas that bigger projects rarely develop
- **Incubation**: can become **foundational** stones for future larger projects, **future** thinking.
- **Efficiency**: science gets generally done within **quicker** timeframes with **smoother** output
- **Flexibility**: small scale allows for **nimble** reaction to emerging **opportunities**

Examples of small experiment success

(just a small subsample!)

PROSPECT & CHANDLER

First surface detection of Rx neutrino, addressed spectrum and rate anomalies



COHERENT

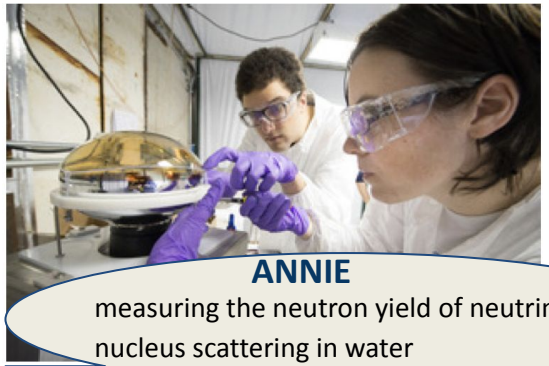
First observation ever of CEvNS neutrino interaction, limits on BSM physics

CONNIE

Rx CEvNS with skipper CCD

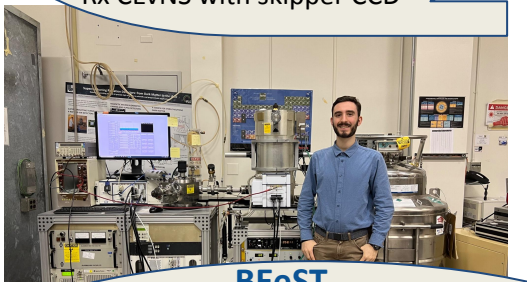
NUCLEUS & MINER

hunting for low-threshold Rx CEvNS with cryogenic detectors



ANNIE

measuring the neutron yield of neutrino nucleus scattering in water



BEeST

looking for sterile neutrino in sub-MeV range, developing superconducting sensors

How to make it better

Challenges

- **Marketing**: research **impact** can be hard to **quantify**, experimental nature can't always be easily justified
- **Management**: larger relative costs of **engineering**, safety approvals, project **management**
- **Community**: smaller scale usually means **weaker**, less unified **voice**

- **Deprioritization**: **funding** focus on larger experiments might place extreme **pressure** on small and mid scale projects

Support

- **Consistent Funding**: dedicated **predictable FOA** for small scale
- **Diverse Funding**: **support** targeted for **non-HEP** host Unis and Labs
- **Management Resources**: community **resource pool** for engineering, H&S, project management expertise

NF: *"Program with healthy breadth in physics, size, timescale of experiments, supported by a deliberate process"*

Community has spoken! Thanks for your attention!

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